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INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for January, 1889, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of nine areas of low pressure are shown; the average number traced for January during the last fifteen years being 12.9.

The areas of high and low pressure and north Atlantic storms are discussed under their respective headings. The severest storms of the month occurred on the 9th, attending the passage of low area iii. Descriptions of the more destructive storms reported on that date, together with charts (vi and vii) exhibiting isobars, isotherms, and wind-directions over the United States and Canada at 8 a. m. and 8 p. m., 75th meridian time, are published in this issue of the REVIEW. Chart i also shows the approximate paths of the centres of eight depressions traced over the north Atlantic Ocean and the limits of fog-belts west of the fortieth meridian. The average number of depressions traced over the north Atlantic for January during the last six years is 10. No ocean ice was reported during the month.

Chart ii exhibits the distribution of mean atmospheric pressure and temperature for the month. The mean temperature was below the normal in the Rocky Mountain districts, at stations in southern and western Texas, and over eastern and southern Florida; the greatest deficiencies being shown in the middle plateau region, where they exceeded 10°. In all other districts the mean temperature was above the normal, the departures being most marked in the north-central part of the country, where they were more than 10°. At several stations in the northern districts the maximum temperature was higher than for any previous January during the periods of observation.

The distribution of precipitation for January 1889, is shown on chart iii, and the normal precipitation for eighteen years is exhibited on chart iv.

The precipitation was deficient on the north Pacific coast, in the northern portions of the plateau districts and eastern Rocky Mountain slope, over an area extending from Louisiana, Mississippi, and northern Alabama to the upper Ohio valley and Lake region, within a small area in the lower Missouri valley, and in portions of New England and the Maritime Provinces; elsewhere the precipitation was in excess of the average for the month. The current and normal precipitation at the various stations and in the several districts is treated in detail under the heading of "Precipitation." In the table of excessive precipitation will be found a record of excessive monthly, daily, and hourly rainfalls for January, 1889. Under this heading there also appears a table giving the aggregate number of excessive monthly, daily, and hourly rainfalls for the several states and territories, as shown by the monthly and supplementary tables of excessive precipitation published in the MONTHLY WEATHER REVIEW during 1888.

Chart v exhibits the depth of snow on the ground at the close of the month, and its discussion appears under the heading of "Precipitation." This chart also shows the limits of freezing weather during January, 1889.

Two additional charts, based upon data contained in the annual summaries of regular and voluntary observers of the Signal Service for 1888, are published with this issue of the REVIEW. Chart viii exhibits annual mean isotherms, and departures from the normal temperatures, and chart ix shows the annual distribution of precipitation over the United States and Canada. These charts and data are discussed under the heading of "Annual Summary for 1888."

Commencing with July, 1888, the meteorological means for the regular stations of the Signal Service have been determined from observations taken twice daily at 8 a. m. and 8 p. m. (75th meridian time). These hours of observation have been permanently adopted to supersede the former system of tri-daily observations taken at eight-hour intervals. The monthly mean temperature for Signal Service stations represents the means of the maximum and minimum temperatures.

In the preparation of this REVIEW the following data, received to February 20, 1889, have been used: the regular semi-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 25 Canadian stations, as telegraphed to this office; 175 monthly journals and 177 monthly means from the former and 25 monthly means from the latter; 544 monthly registers from voluntary observers; 107 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for January, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. On July 1, 1888, the tri-daily observations of the Signal Service were superseded by observations taken twice daily at the hours named. A protracted series of hourly observations has shown that the difference is almost inappreciable between the mean pressure obtained from two observations taken at these hours and that determined from tri-daily observations taken at eight-hour intervals.